REMARKS

This Amendment amends independent claim 26 to recite an identical binding moiety site location feature, which is an inherent feature of a genetically fused protein. See Dr. Lamminmaki's declaration, filed April 3, 2009. Accordingly, the amendment of claim 26 does not insert any new matter into the application. See MPEP §2163.07(a)("By disclosing in a patent application a device that inherently performs a function or has a property, operates according to a theory or has an advantage, a patent application necessarily discloses that function, theory or advantage, even though it says nothing explicit concerning it. The application may later be amended to recite the function, theory or advantage without introducing prohibited new matter.") Claims 26-38 are pending.

A Request for Continued Examination is attached. Entry of this Amendment is requested.

Examiner Yu is thanked for the courtesies extended to the undersigned during a telephonic interview held September 1, 2010. Product-by-process claim 26 was discussed during the interview, as was the propriety of combining Patent No. 4,959,306 to Kameda et

al. and U.S. Patent No. 7,135,295 to Willner et al. No agreement was reached during the interview.

The 35 U.S.C. § 103(a) rejection of claims 26, 27, 29 and 36-38 over U.S. Patent No. 4,959,306 to Kameda et al. in view of U.S. Patent No. 7,135,295 to Willner et al. is traversed. The claimed nanoparticle is a recombinant apoferritin particle (or a recombinant Dpr protein particle or recombinant Dps protein particle) in which at least a first binding moiety is genetically fused to protein and/or peptide subunits, such that all corresponding subunits of the apoferritin where a first binding moiety has been genetically fused are each located at the same position in the subunit's polypeptide chain.

The cited references fail to raise a prima facie case of obviousness against the claimed nanoparticle. First, Willner et al. cannot be cited against the claims because Willner et al. is non-analogous art.

The Patent Office cites In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992) for a two-part test to determine whether a reference is from an analogous art: the reference must either (1) be in the field of the applicants' endeavor or (2) be

reasonably pertinent to the particular problem with which the applicants were concerned.

1. Willner et al. Is *Not* Within The Applicants' Field of Endeavor

The present invention relates to ferritin nanoparticles (or a Dpr or Dps nanoparticle) for bioaffinity assays (Specification, page 1, lines 2-4; claim 26). In contrast, Willner et al. is directed to sensors, specifically piezoelectric sensors (Col. 1, lines 10-15). Accordingly, Willner et al. is *outside* the applicants' field of endeavor.

2. Willner et al. Is *Not* Reasonably Pertinent to the Particular Problem Addressed by Applicants

A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem. See In re Icon Health & Fitness, 496 F.3d 1374, 1379 (Fed. Cir. 2007). In this case, the particular problem addressed by applicants is the avoidance of heterogenous reaction products produced by chemical conjugation in the production of

ferritin nanoparticles. See paragraph No. 7 of Dr. Lamminmäki's Rule 132 Declaration, filed April 3, 2009.

In contrast, the problem confronting Willner et al. is the inability of quartz crystal microbalance sensors to detect small molecules such as explosives and drugs (Col. 3, lines 2-8). Willner et al. fails to disclose apoferritin nanoparticles. Moreover, Willner et al. only briefly mentions chemical conjugation and genetic fusion as apparently alternative methods for producing a neutralizing agent having a specific binding affinity for an analyte of interest. Willner et al. utterly fails to disclose or suggest one technique produces identical fusion proteins while the other produces heterogenous reaction products.

Willner et al. - directed to piezoelectric sensors capable of detecting small molecules - would not have logically commended itself to the applicants' attention while they were considering the problem of heterogeneous reaction products created in synthesis of apoferritin particles, Icon Health, supra. In short, Willner et al. is not "reasonably pertinent" to the problem addressed by the applicants.

The Patent Office argues Willner et al. is "relevant" to the applicants' claims (Official Action, page 9, paragraph No. 3), and

thus presumably is analogous prior art. However, the mere fact that Willner et al. may mention a technique which may be used to produce the claimed nanoparticle does not, by itself, mean the reference is analogous art. See In re Oetiker. In this case, the two-part test under Oetiker demonstrates Willner et al. is *non*-analogous art, and thus cannot be cited against the claims.

Second, one of ordinary skill in the art would not combine Kameda et al. and Willner et al. to arrive at the claimed nanoparticle. Kameda et al. fails to disclose the genetically fused first binding moiety of the claimed recombinant nanoparticle. Instead, Kameda et al. chemically binds its binding moieties to ferritin subunits, which produces random distribution of the binding moieties on the polypeptide chain. See paragraph No. 10 of the Lamminmäki Declaration.

Willner et al. fails to disclose or suggest the use of apoferritin as one of its neutralizing agents. Instead, Willner et al. merely mentions a binding domain may be conjugated or fused to a macromolecular moiety, and that such conjugation or fusion "may be achieved, as known, by chemical binding, by genetic engineering techniques, etc." This bald disclosure does not include any mention of the relative advantages or disadvantages of the two

techniques. Nor is there any suggestion to prepare recombinant apoferritin particles from genetically fused binding moieties.

One of ordinary skill in the art is given no apparent reason, motivation or suggestion to replace the chemical conjugation taught by Kameda et al. with the genetic engineering technique briefly mentioned in Willner et al., especially since both chemical conjugation and genetic fusion techniques are mentioned by Willner et al.

The Patent Office argument that these two techniques are "functionally equivalent" misses the mark. It is not enough that both techniques are known. Instead, the Patent Office must explain why one of ordinary skill in the art would choose to replace the chemical conjugation taught by Kameda et al. with genetic fusion techniques, especially when Willner et al. appears to disclose chemical conjugation and genetic engineering techniques are functionally equivalent.

In fact, the two techniques are not functionally equivalent when applied to apoferritin chemistry. Ferritin nanoparticles produced by chemical conjugation of protein subunits comprise a heterogeneous reaction product in which chemical conjugation can occur in different positions in the ferritin sub-unit. In

contrast, the claimed ferritin nanoparticle produced by genetic fusion comprise a homogenous reaction product in which each fusion protein comprising a given type of ferritin subunit and a first binding moiety has an identical fusion site located at the same position in the subunit's polypeptide chain. See paragraph Nos. 6-8 of the Lamminmäki Declaration.

Willner et al. utterly fails to disclose or suggest genetic fusion techniques will produce a different neutralizing agent than one produced by chemical binding.

The mere fact that fusion proteins per se were known does not render the claimed nanoparticle obvious to one of ordinary skill in the art. Taken to its logical conclusion, the Patent Office argument would hold *all* recombinant products *per se* obvious once the art of genetic engineering was discovered, regardless of the structural distinctions and properties of the specific recombinant product. In this case, the claimed recombinant nanoparticle comprises all essential characteristics required for use in a ligand binding bioaffinity assay because characteristics not intrinsic to ferritin *per se* have been introduced via genetic fusion into the ferritin protein.

It is respectfully submitted the Patent Office has improperly employed hindsight to pick and choose an isolated disclosure in Willner et al. to modify Kameda et al., despite the absence of any motivation or suggestion within the cited prior art to prepare recombinant apoferritin particles from genetically fused binding moieties. Again, it is not sufficient merely to show each of the elements of the claimed nanoparticle were known; there must be some showing that one of ordinary skill in the art would modify the references as suggested by the Patent Office. Reconsideration and withdrawal of the obviousness rejection of claims 26, 27, 29 and 36-38 over Kameda et al. in view of Willner et al. are respectfully requested.

The remaining obviousness rejections are each traversed on the ground that Kameda et al. and Willner et al. have been improperly combined, and that their improper combination does not render the claimed nanoparticle obvious, for the reasons set forth above.

It is believed this application is in condition for allowance. Reconsideration and withdrawal of all rejections of claims 26-38, and issuance of a Notice of Allowance directed to those claims, are earnestly requested. The Examiner is urged to telephone the

undersigned should she believe any further action is required for allowance.

The fees for the RCE and the extension of time are being paid electronically today. It is not believed any additional fee is required for entry and consideration of this Request for Reconsideration. Nevertheless, the Commissioner is authorized to charge Deposit Account No. 50-1258 in the amount of any such required fee.

Respectfully submitted,

/James C. Lydon/

James C. Lydon
Reg. No. 30,082

Atty. Case No.: **TUR-172**
100 Daingerfield Road
Suite 100
Alexandria, Virginia 22314
Telephone: (703) 838-0445
Facsimile: (703) 838-0447

Enclosures:
Petition for Extension of Time
Request for Continued Examination